

Nonresponse Bias During the Pandemic

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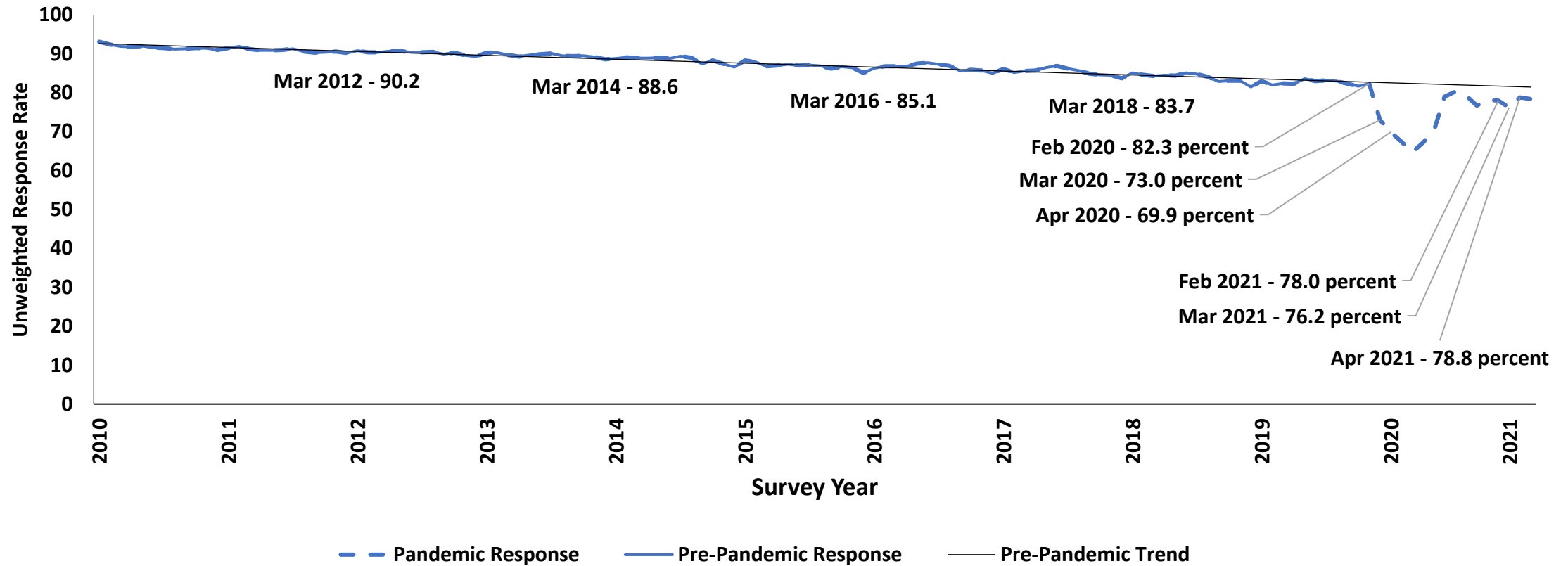
September 23, 2021

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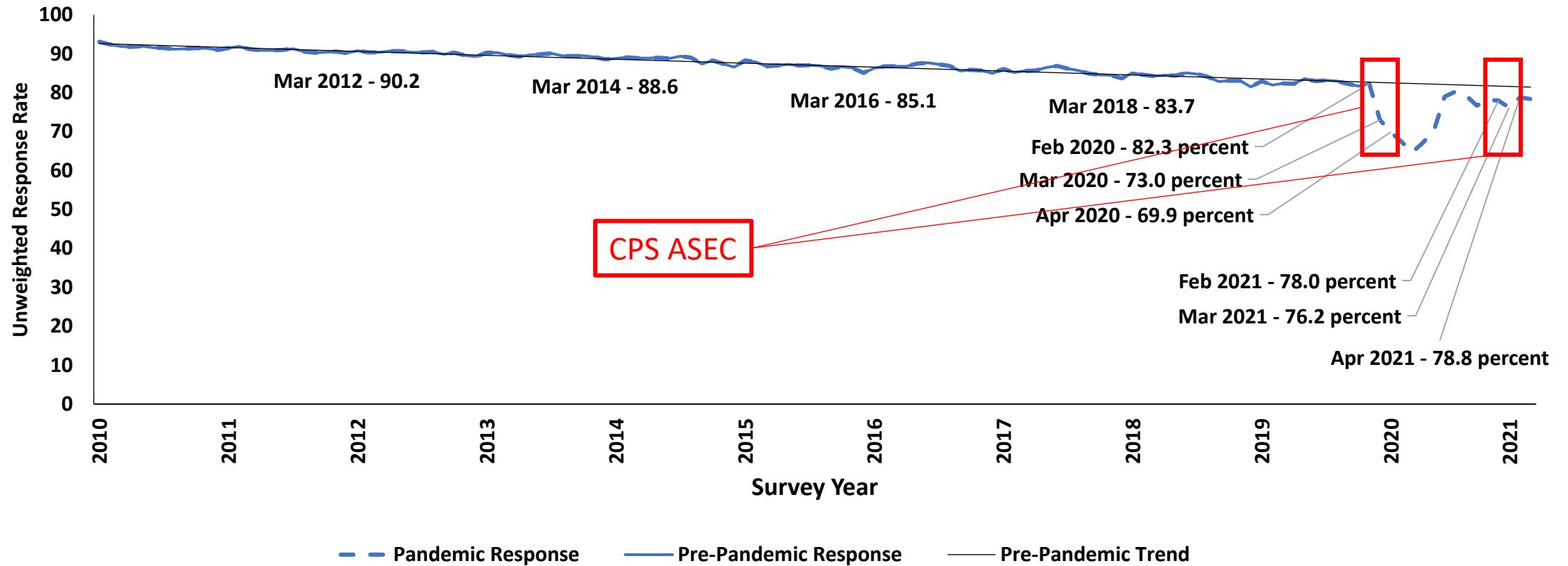
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Response in the Current Population Survey



Source: Bureau of Labor Statistics – <https://www.bls.gov/osmr/response-rates/household-survey-response-rates.htm>

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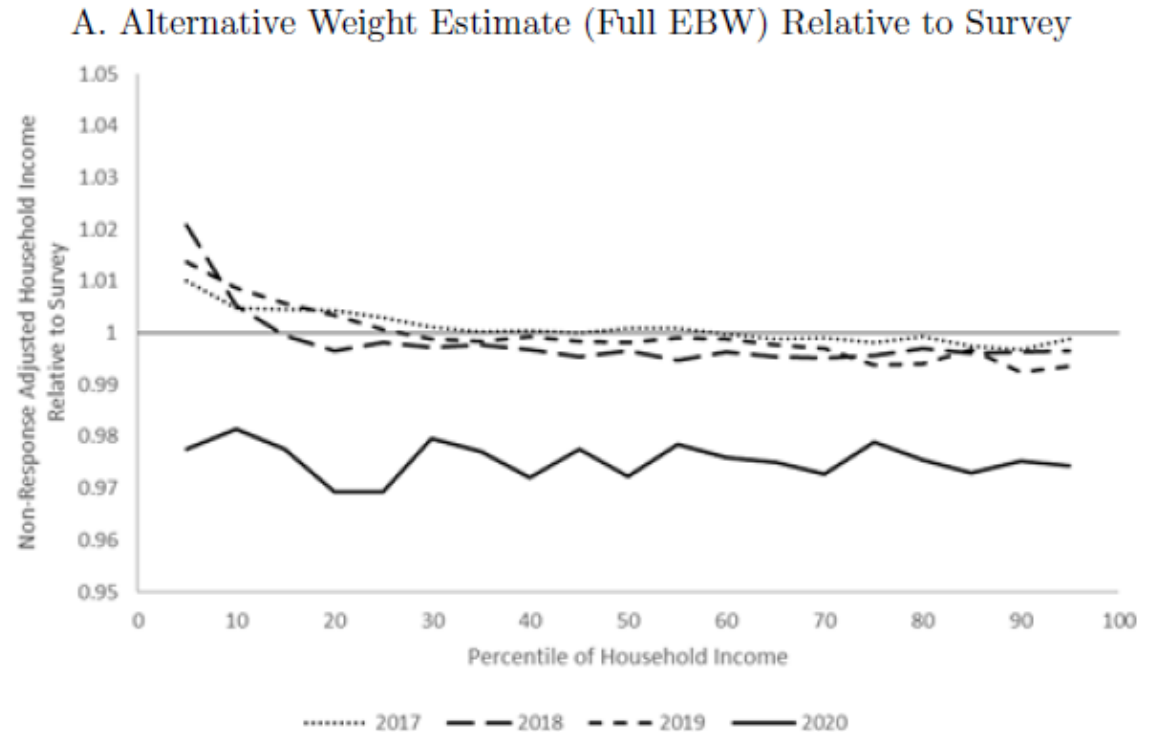
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What We Do

- Use linked administrative, census, and prior survey data to evaluate nonresponse bias
- Apply entropy balancing to reweight the sample to correct for nonresponse bias
 - Condition on linked data and external population controls

Preview of Results in the CPS ASEC (2020)

- No evidence of nonresponse bias for income or poverty from 2017-2019
- 2020 survey estimates overstate income by 2-3 percent across the distribution

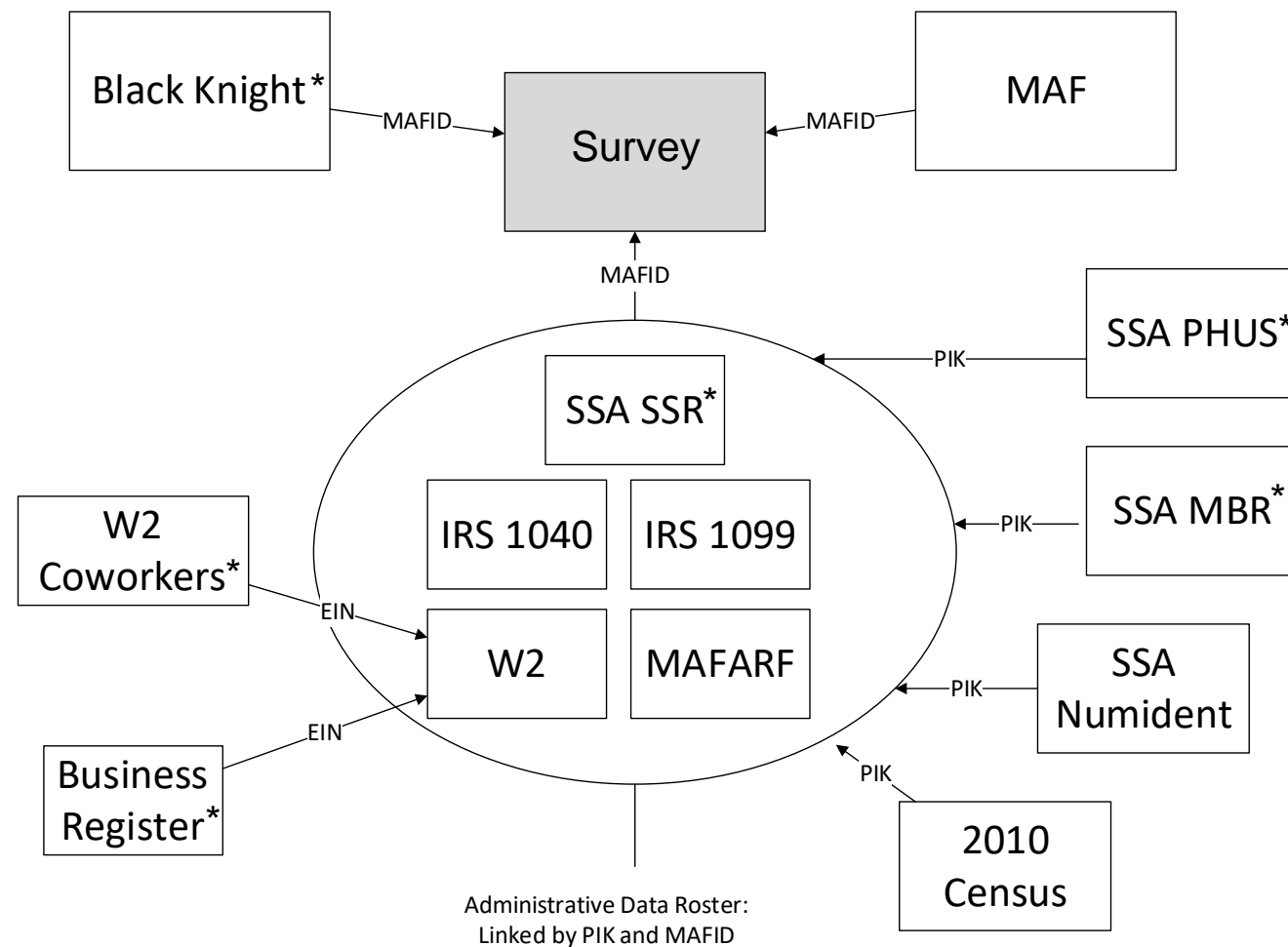


Source: U.S. Census Bureau 2017-2020 Current Population Annual Social and Economic Supplement linked to administrative, census, and survey data as indicated in Table 1. The 2017 and 2018 files are the CPS ASEC Research and Bridge Files, respectively.

Data

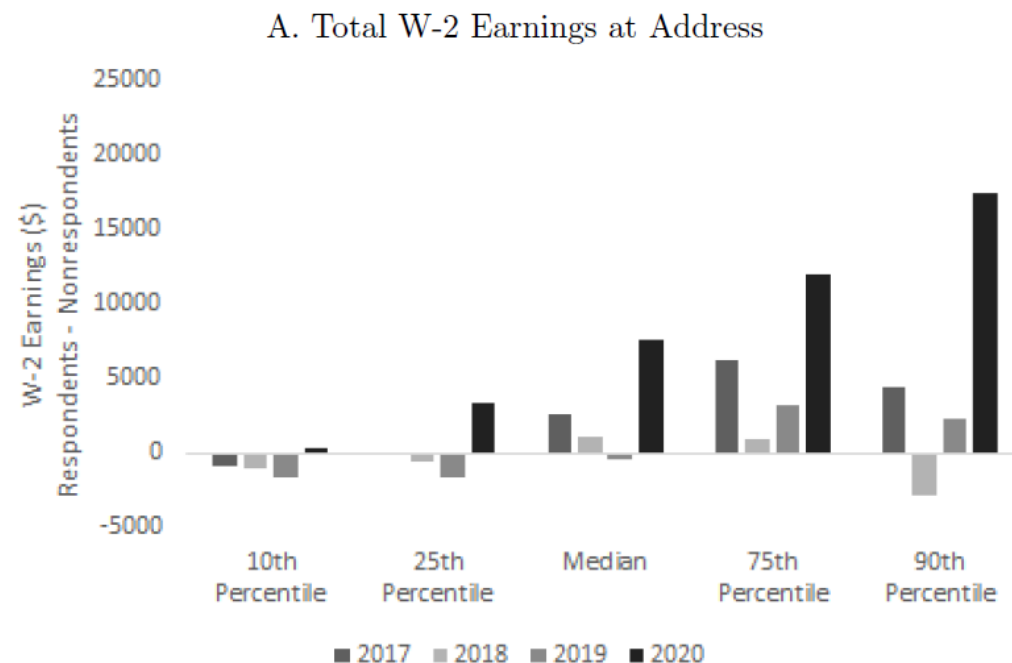
- Data Linkage
 - Link administrative data to addresses of both **respondents** *and* **nonrespondents**
- What We Have
 - Housing – MAF, Black Knight*
 - Income/Employment – W2, 1040, 1099s, PHUS*, SSR*, MBR*, Business Register*
 - Demographics – Numident, 2010 Census. Includes race, Hispanic-origin, citizenship, age, gender
 - Household composition/marital status – 1040
- What We Don't Have
 - Direct measures of education, health insurance status, among other stats
 - Any information in linked data for households that can't be linked by MAFID

* Indicates source used in ACS work only



Nonrandom Nonresponse

Income Difference between Respondents and Nonrespondents

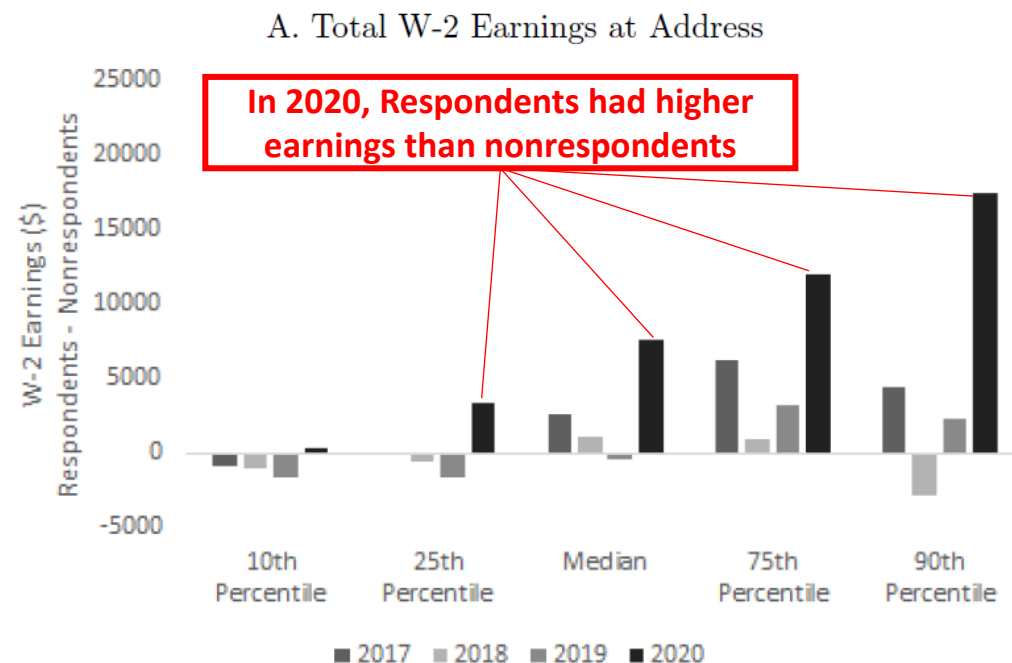


Source: U.S. Census Bureau 2017-2020 Current Population Annual Social and Economic Supplement linked to administrative, census, and survey data as indicated in Table 1. The 2017 and 2018 files are the CPS ASEC Research and Bridge Files, respectively.

Notes: This figure shows the difference in income by address between respondents and nonrespondents. Panel A shows total W-2 earnings at that address in the reference year of the survey. Panel B shows total 1040 AGI in the prior year for linked individuals at the survey address. A value of greater than zero indicates higher income for respondents than nonrespondents for that statistic and year.

Nonrandom Nonresponse

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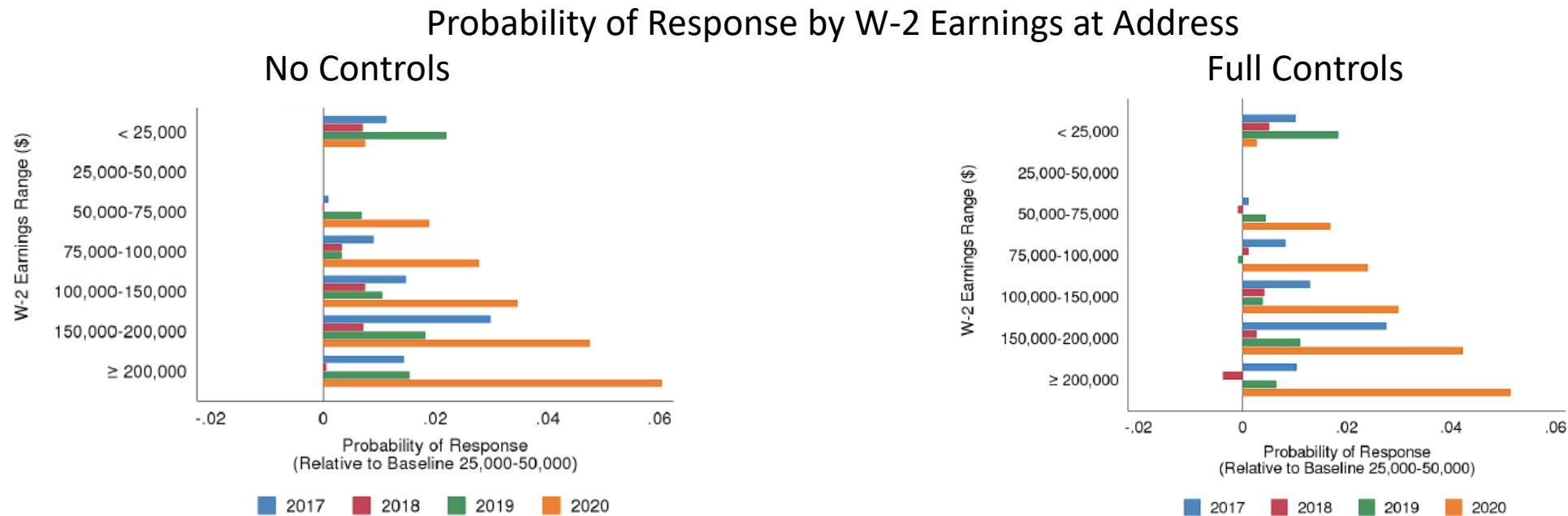
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Weighting in the CPS ASEC

- Base weights based on probability of selection of housing unit
- Adjust for metro/non-metro area response rates
- Rake to pop controls in state x age x gender x race (Black and White) and Hispanic-origin cells

Do the Weights Control for Nonrandom Nonresponse?

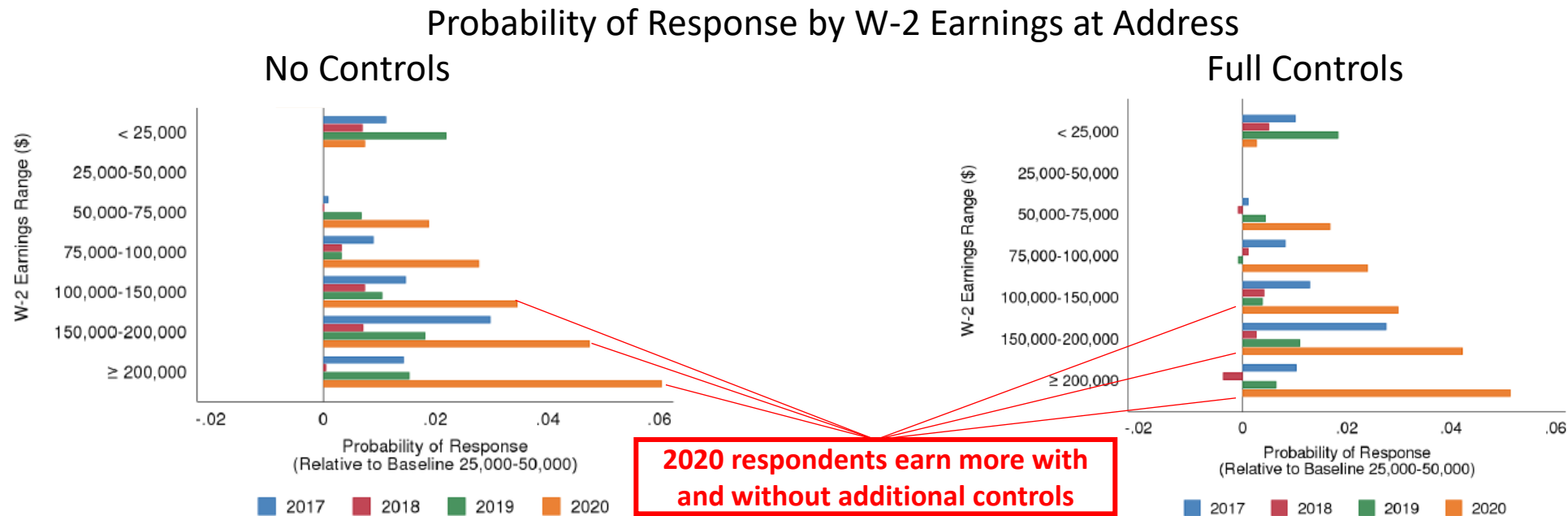
- Control for the same demographic information as the survey weights (age, race, Hispanic origin, gender) using the linked administrative data, as well as citizenship, education, etc. from other linked sources



Source: U.S. Census Bureau 2017-2020 Current Population Annual Social and Economic Supplement linked to administrative, census, and survey data. The 2017 and 2018 files are the CPS ASEC Research and Bridge Files, respectively.

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Where Do We Stand So Far

- Evidence of nonresponse bias in survey characteristics that are not part of weighting (citizenship, education)
- Response-gradient by income likely would lead to biased income statistics
- Not likely to be controlled for with survey weights
- Need new weights!

Entropy Balancing

- Hainmueller, 2012. “Entropy balancing for causal effects: A multivariate reweighting method to produce balanced samples in observational studies”
 - Reweight a control group to match the characteristics of a treatment group
 - Treat reweighting as an optimization problem, rather than starting from a regression
 - In practice, an efficient form of raking

Entropy Balancing – Advantages

- Flexibility – easy to include external moment conditions (like pop controls)
- Statistical efficiency – final weight is as close as possible to initial weight given how optimization occurs
- Computational efficiency – it is fast
- Directly adjusts weights to target moments – balance is assured

Entropy Balance Weights (EBW) in CPS ASEC

- Adjust weights to:
 - Address-level statistics from linked administrative, survey, and decennial census data
 - Person-level population controls
- Different levels of aggregation
- Two-stage reweighting
 - Adjust household weights given linked data (nonresponse factor)
 - Adjust person weights to pop controls, while maintaining household adjustment

Results

Demographics and Socioeconomic Characteristics

Difference by Characteristic in Survey Responses
Between the EBW and Survey Weights

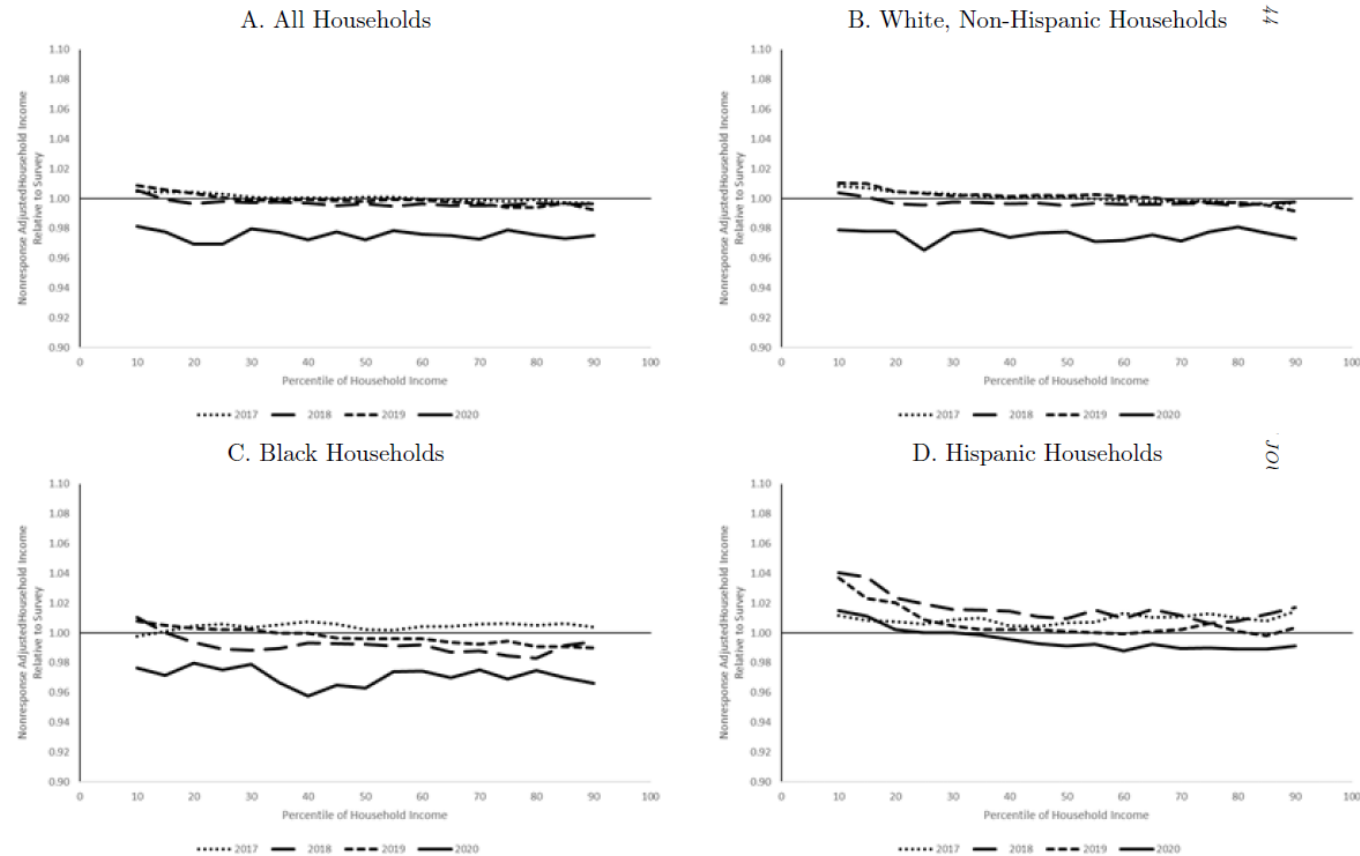
Characteristic		2017	2018	2019	2020
Race/Hispanic Origin					
	White	Z	Z	Z	Z
	Black	Z	Z	Z	Z
	Hispanic	Z	Z	Z	Z
Citizenship					
	Native	0.21*	0.21*	0.19	0.04
	Foreign-Born	-0.15**	-0.18**	-0.18**	-0.15
	Non-citizen	-0.06	-0.03	-0.01	0.11
Education					
	< High School	0.07	0.16	0.11	0.37***
	High School	0.11	0.07	0.17	0.38*
	Bachelor's	-0.24	-0.19	-0.26	-0.57***
	Advanced Degree	-0.21	-0.21	-0.25**	-0.46***

Source: U.S. Census Bureau 2017-2020 Current Population Annual Social and Economic Supplement

Note: This table shows weighted summary statistics of the sample over time. Note that the race groups are not mutually exclusive, and an individual can be classified as in one or more groups based on their survey response. ***, **, and * indicate statistical significance at the 1-, 5-, and 10-percent levels respectively. Z indicates an estimate rounds to 0 (is less than < 0.005 in absolute value).

Results

Income by Subgroup



Source: U.S. Census Bureau 2017-2020 Current Population Annual Social and Economic Supplement linked to administrative, census, and survey data as indicated in Table 1. The 2017 and 2018 files are the CPS ASEC Research and Bridge Files, respectively.

Notes: Each panel shows estimates of the distribution of household income using the alternative weights (Full EBW) relative to the survey weights. For example, in Panel A from 2017 to 2019, the lines are very close to 1 across the distribution, indicating that the alternative weights do not have an economically meaningful impact on estimates of the household income distribution in those years.

Application to the ACS 1-Year File

- Experimental weights for 2019 and 2020 ACS
 - Assess methodological change (2019) separate from pandemic nonresponse (2020)
- Improvements
 - State-level weighting, with county-level controls (for counties $\geq 65,000$ people)
 - Additional administrative data (noted with “*” in the [Data](#) slide)
 - Model improvements – for example, better handling of the weights of children and non-householder adults
 - Include a subsampling factor adjustment introduced in 2020 for 2019
- Limitations
 - Do not adjust weights for GQs, Puerto Rico, and vacant units – limited availability of administrative data

Contact Information

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